NATURAL RESOURCES CONSERVATION SERVICE

CONSERVATION PRACTICE STANDARD

SEDIMENT BASIN

(No.)

CODE 350

DEFINITION

A basin constructed to collect and store debris or sediment.

SCOPE

This standard applies to the installation of all basins where the primary purpose is to trap and store waterborne sediment and debris.

PURPOSE

To preserve the capacity of reservoirs, ditches, canals, diversions, waterways, and streams; to prevent undesirable deposition on bottom lands and developed areas; to trap sediment originating from construction sites; and to reduce or abate pollution by providing basins for deposition and storage of silt, sand, gravel, stone, agricultural wastes, and other detritus.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies where:

1. Physical conditions or land ownership preclude treatment of a sediment source by the installation of erosion-control measures to keep soil and other material in place.
2. A sediment basin offers the most practical solution to the problem.

DESIGN CRITERIA

The capacity of the sediment basin shall equal the volume of sediment expected to be trapped at the site during the planned useful life of the basin or the improvements it is designed to protect. If it is determined that periodic removal of sediment will be practicable, the capacity may be proportionately reduced.

The design of dams, spillways, and drainage facilities shall be according to SCS standards for ponds (378) and grade stabilization structures (410) or according to the requirements in TR-60, as appropriate for the class and kind of structure being considered.

Temporary basins having drainage areas of 5 acres or less and a total embankment height of 5 ft or less may be designed with less conservative criteria if conditions warrant. The embankment shall have a minimum top width of 4 ft and side slopes of 2:1 or flatter. An outlet shall be provided of earth, pipe, stone, or other devices adequate to keep the sediment in the trap and to handle the 10 year-frequency discharge without failure or significant erosion.

Provisions shall be made for draining sediment pools if necessary for safety and vector control. Fencing and other safety measures shall be installed as necessary to protect the public from floodwater and soft sediment. Due consideration shall be given to good visual resource management.

PLANS AND SPECIFICATIONS

Plans and specifications for installing sediment basins shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purpose.

NRCS, OK
January 1987

SUPPLEMENT

(January 1987)

CONDITIONS WHERE PRACTICE APPLIES

This practice applies where erosion from a given drainage area is determined to be excessive, sedimentation downstream is detrimental, and the source cannot be treated otherwise.

DESIGN CRITERIA

Capacity Sediment basins shall be designed for a minimum of 10-year storage capacity unless the practice is to serve as a temporary measure.

Yield Erosion rates shall be determined by use of the Universal Soil Loss Equation (USLE). If gully and/or ephemeral gully erosion is significant, an estimate of the erosion volume from these sources should be made in addition to that determined by the USLE. This may require the assistance of a geologist.

The sediment delivery ratio shall be determined by using Figure 1 for drainage areas up to five square miles. On drainage areas greater than five square miles, assistance from a geologist is required to determine the delivery ratio. The deliver ratio from gully erosion will be in the range of 80 to 95 percent depending on location of the gully with respect to the sediment basin.

The trap efficiency of the reservoir shall be determined by the following:

1. Determine the average annual runoff in inches.

2. Determine the approximate capacity of the reservoir to the emergency spillway elevation in inches of storage.

3. Divide the approximate total capacity in inches by the average annual runoff in inches to obtain the capacity-inflow (C/I) ratio.

4. The trap efficiency for a given C/I ratio is determined on the vertical axis of Figure 2. The texture of the sediment should be estimated on the basis of character of watershed soils and the principal sources of sediment. Where incoming sediment is assumed to have a predominance of bedload or coarse material or is highly flocculated, the upper curve of Figure 2 should be used to determine the trap efficiency. If the incoming sediment is composed primarily of colloids, dispersed clays and fine silts, the lower curve should be used. The median curve is representative of incoming sediment consisting of a wide distribution of various grain sizes.

The sediment yield shall be the product of the erosion rate and the delivery ratio.

The required sediment storage is the product of the sediment yield, the trap efficiency, and the planned storage life for the sediment basin.

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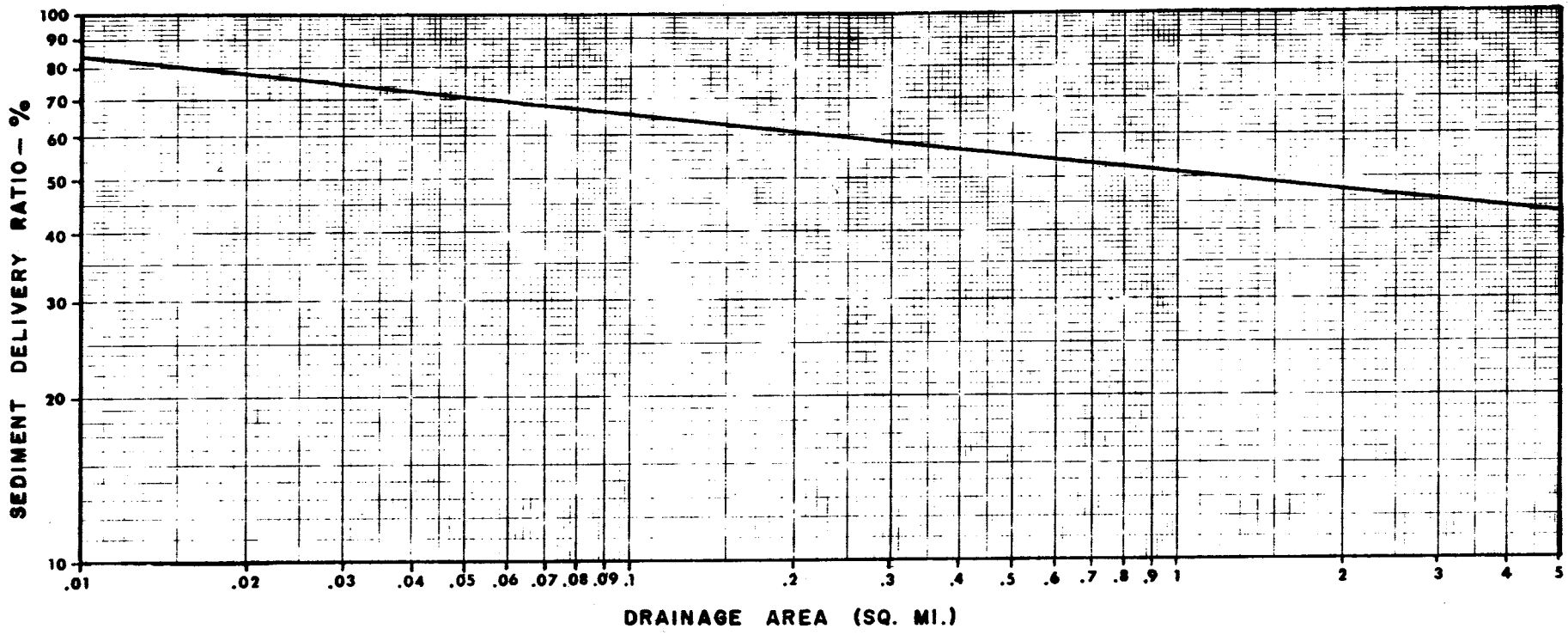

Figure 1. Size of Drainage Area – Sediment Delivery Ratio Curve.

OK350-3

(Extrapolated from Figure 3, Technical Guide – 12, STSC, June, 1976.)

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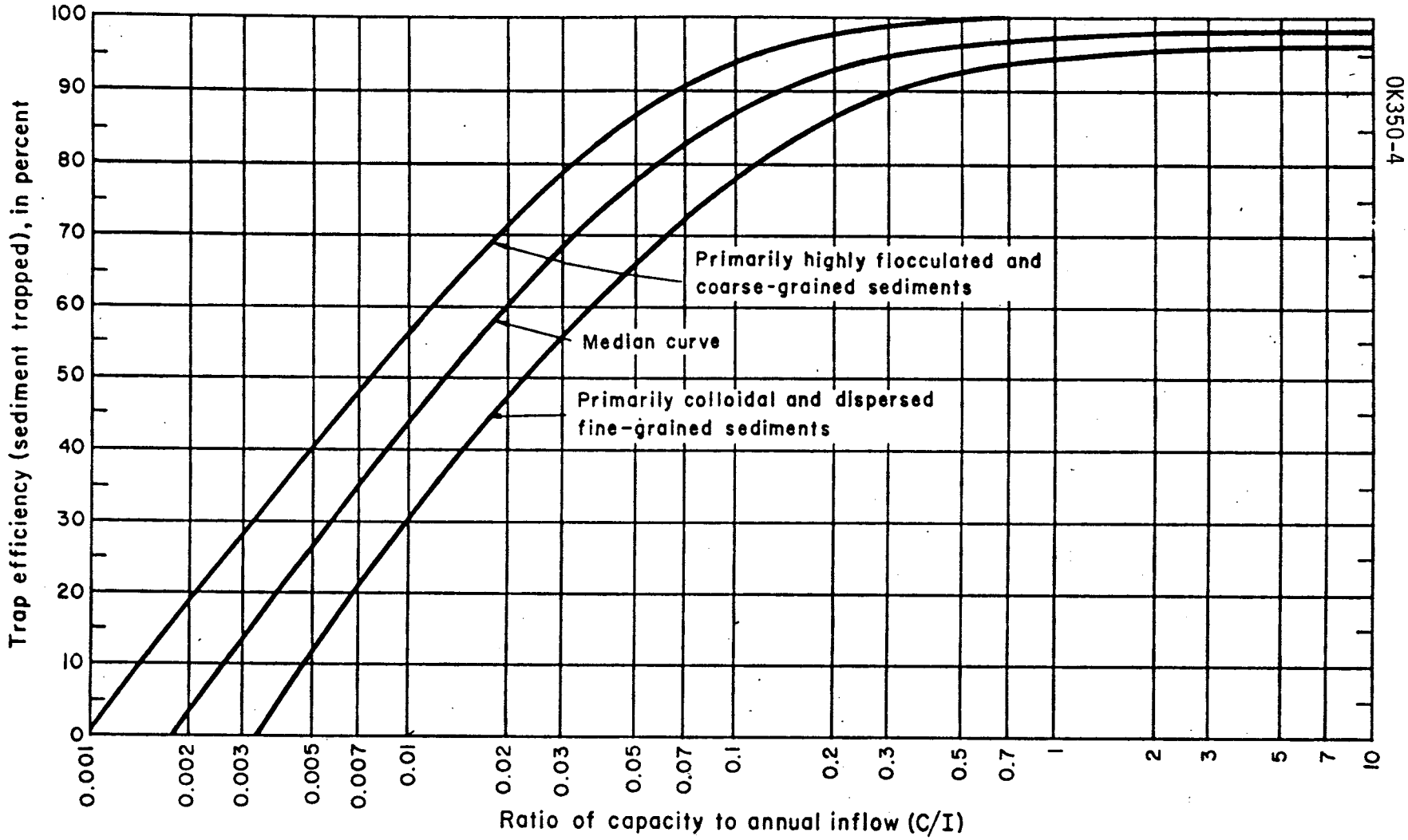

Figure 2. Trap Efficiency of Reservoirs

(From TR No. 12, Rev. January 1975)

NATURAL RESOURCES CONSERVATION SERVICE

CONSERVATION PRACTICE GENERAL SPECIFICATIONS

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SEDIMENT BASIN SPECIFICATIONS

Construction of sediment basins within the scope of the standard for ponds (378) shall have, as a minimum, specifications commensurate with those for ponds (378). Those within the scope of TR-60 shall be in accord with the guide specifications contained in the National Engineering Handbook, Section 20.

SUPPLEMENT

Construction specifications for sediment basins shall he those for ponds (378), grade stabilization structures (410), or in accord with NEH, Section 20, commensurate with appropriate design criteria.

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Planning considerations for water quantity and quality

Quantity

1. Effects on the water budget, especially volumes and rates of runoff, infiltration, evaporation, deep percolation, and ground water recharge.
2. Effects on downstream flows and aquifers that would affect other water uses and users.
3. Effects on volume of discharge flow on the environmental, social, and economic conditions.
4. Effects on the water table downstream and the results of changes of vegetative growth.

Quality

1. Effects on erosion, movement of sediment, pathogens, and soluble and sediment attached substances.
2. Effects on the visual quality of onsite and downstream water resources.
3. Effects of construction and early establishment of protective vegetation on the surface and ground water.
4. Effects on wetlands and water-related wildlife habitats.

NRCS, OK
October 1988